CLAIMS

1. An isolated DNA selected from the group consisting of :

(a) a DNA encoding a protein consisting of the amino acid sequence of SEQ. ID. NO. 2;

(b) a DNA consisting of the coding region of the nucleotide sequence of SEQ. ID. NO. 1;

(c) a DNA encoding a protein comprising one or more substitutions in the amino acid sequence of SEQ ID NO: 2 wherein the encoded protein is a functional equivalent of the protein consisting of the amino acid sequence of SEQ. ID. NO. 2; and

(d) a DNA hybridizing under stringent conditions with a DNA consisting of the nucleotide sequence of SEQ. ID. NO.1, such that the encoded protein is a functional equivalent to the protein consisting of the amino acid sequence SEQ. ID. NO.2

(e) a DNA encoding a partial peptide of the protein consisting of the amino acid sequence of SEQ. ID. NO.2.

2. A vector comprising the DNA of claim 1

3. A transformed cell comprising the DNA of claim 1.

4. A transformed cell comprising the vector of claim 2.

5. An isolated protein encoded by the DNA according to claim 1, wherin said protein promotes cell proliferation or activates treancription of a target gene.

6. An isolated polypeptide comprising the amino acid sequence of SEQ ID NO: 2 or fragment thereof .

7. A method for producing a protein, comprising the steps of culturing the transformed cell of claim 4, and collecting the protein expressed from the cells or the culture supernatant thereof.

8. A transcription activation complex comprising the protein of claim 5 and at least one-co-activator.

9. The complex of claim 8, the co-activator is selected from the group consisting of an RNA helicase, and an RNA polymerase II.

10. An antibody that bind immunospecifically to the protein of claim 5 or the complex of claim 8.

11. A polynucleotide comprising at least 15 nucleotides, wherein said polynucleotide hybridizes under stringent conditions to the nucleotide sequence of SEQ. ID. NO.1 or the complement of said nucleotide sequence

12. A composition comprising the antibody of claim 10 or the polynucleotide of claim 11.

13. A method of screening for a compound that binds to the protein of claim 5, comprising the steps of:

(a) contacting a subject sample, containing at least one test compound, with the protein of claim 5 or a fragment thereof;

(b) detecting the binding activity of the subject sample with the protein or fragment thereof; and

(c) selecting the test compound that binds to the protein or fragment thereof.

14. A compound identified by the method of claim 13.

15. A method of screening for a compound that inhibits the activity of the protein of claim 5, comprising the steps of:

(a) culturing cells which express the protein of claim 5 or fragment thereof in the presence of a subject sample which contains at least one test compound;

(b) detecting the proliferation of the cell; and

(c) selecting the test compound that inhibits the proliferation as compared to the proliferation detected in the absence of the subject sample.

16. A compound identified by the method of claim 15.

17. A method of screening a compound for anti-cancer activity, comprising the steps of:

(a) contacting a subject sample, containing at least one test compound, with the protein of claim 5, a co-activator thereof and a DNA containing the target sequence of said protein under suitable conditions to allow formation of the complex of said protein with the DNA; and

(b) selecting the test compound that inhibits the formation of the complex.

18. The method of claim 17, wherein said target sequence comprises a CBS sequence flanking the 5' region of EGFR.

19. A method of screening a compound for anti-cancer activity, comprising the steps of:

(a) contacting a subject sample, containing at least one test compound, with the complex

of claim 7 and a reporter gene with a transcriptional regulatory region recognized by said complex; and

(b) selecting the test compound that inhibits the expression of the reporter gene.

20. The compound identified by the method of claim 17.

21. The compound identified by the method of claim 18

22. The compound identified by the method of claim 19.

23. An anti-cancer composition comprising the compound of claim 20.

24. An anti-cancer composition comprising the compound of claim 21.

25. An anti-cancer composition comprising the compound of claim 22.

26. An anti-cancer composition comprising an antisense oligonucleotide, ribozyme, or small interference RNA that binds to the DNA of claim 1.

27. A method diagnosing cancer, wherein said method comprises the steps of:

(a) determining a expression level of the ZNFN3A1 gene in biological sample of specimen;

(b) comparing the expression level of ZNFN3A1 gene with that in normal sample, and

(c) defining a high expression level of the ZNFN3A1 gene in the sample as having a cancer.

28. The method of claim 27, wherein the cancer is hepatocellular carcinoma.

29. A diagnostic agent for diagnosing hepatocellular carcinoma comprising a compound that binds to the DNA of claim 1

30. A diagnostic agent for diagnosing hepatocellular carcinoma comprising a compound that binds to protein of claim 5.

31. A method of inhibiting tumor cell growth in a subject, comprising administering to said subject a composition comprising a ZNFN3A1 small interfering RNA (siRNA).

32. The method of claim 31, wherein said siRNA comprises a sense ZNFN3A1 nucleic acid and a anti-sense ZNFN3A1 nucleic acid.

33. The method of claim 32, wherein said tumor cell is colorectal cancer cell or liver cancer cell.

34. The method of claim 33, wherein said colorectal cancer cell is an adenocarcinoma cell.

35. The method of claim 33, wherein said liver cancer cell is a hepatocellular carcinoma cell.

36. The method of claim 32, wherein the siRNA is specific for a ZNFN3A1 target selected from the group consisting of nucleotides 451-471, 532-552, 623-643, 625-645, 636-656,726-746, 923-943, 1065-1085, and 1258-1278 of SEQ ID NO:1.

37. The method of claim 36, wherein the siRNA has the general formula 5'-[A]-[B]-[A']-3', wherein [A] is a ribonucleotide sequence coresponding to a sequence selected from the group consisting of nucleotides 451-471, 532-552, 623-643, 625-645, 636-656,726-746, 923-943, 1065-1085, and 1258-1278 of SEQ ID NO:1,

[B] is a ribonucleotide sequence consisting of 3 to 23 nucleotides, and

[A'] is a ribonucleotide sequence consisting of the complementary sequence of [A].

38. The method of claim 31, wherein said composition comprises a transfection-enhancing agent.

39. An isolated polynucleotide comprising a combination of a sense strand nucleic acid and an antisense strand nucleic acid, wherein said sense strand nucleic acid comprises nucleotide seqnence selected from the group consisting of nucleotides 451-471, 532-552, 623-643, 625-645, 636-656,726-746, 923-943, 1065-1085, and 1258-1278 of SEQ ID NO:1, and said antisense strand nucleic acid consists of complementary sequence thereof, respectivery.

40. The isolated polynucleotide of claim 39, wherein said sense strand nucleic acid and antisense strand nucleic acid are on the same strand.

41. The isolated nucleic acid molecule of claim 39, wherein said sense strand nucleic acid consists of a nucleotide sequence shorter than about 100 nucleotides.

42. The isolated nucleic acid molecule of claim 41, wherein said sense strand nucleic acid is shorter than about 75 nucleotides.

43. The isolated nucleic acid molecule of claim 42, wherein said sense strand nucleic acid is shorter than about 50 nucleotides.

44. The isolated nucleic acid molecule of claim 43, wherein said sense strand nucleic acid is shorter than about 25 nucleotides.

45. The isolated nucleic acid molecule of claim 44, wherein said sense strand nucleic acid is between about 19 and about 25 nucleotides in length.

46. A vector comprising a nucleic acid molecule comprising a combination of a sense strand nucleic acid and an antisense strand nucleic acid, wherein said sense strand nucleic acid comprises nucleotide seqnence selected from the group consisting of nucleotides 451-471, 532-552, 623-643, 625-645, 636-656, 726-746, 923-943, 1065-1085, and 1258-1278 of SEQ ID NO:1, and said antisense strand nucleic acid consists of complementary sequence thereof, respectivery.

47. The vector of claim 46, wherein said nucleic acid molecule has the general formula 5'-[A]-[B]-[A']-3', wherein [A] is a nucleotide sequence selected from the group consisting of nucleotides 451-471, 532-552, 623-643, 625-645, 636-656,726-746, 923-943, 1065-1085, and 1258-1278 of SEQ ID NO:1,

[B] is a nucleotide sequence consisting of 3 to 23 nucleotides, and

[A'] is a nucleotide sequence consisting of the complementary sequence of [A].

48. A composition comprising at least one siRNA comprising a combination of a sense strand nucleic acid and an antisense strand nucleic acid, and pharmaceutically acceptable carrier, wherein said sense strand nucleic acid comprises ribonucleotide seqnence coresponding to a sequence selected from the group consisting of nucleotides 451-471, 532-552, 623-643, 625-645, 636-656,726-746, 923-943, 1065-1085, and 1258-1278 of SEQ ID NO:1, and said antisense strand sequence consists of complementary sequence thereof, respectivery.

49. A double-stranded molecule comprising a sense strand and an antisense strand, wherein the sense strand comprises a ribonucleotide sequence corresponding to a ZNFN3A1 target sequence, and wherein the antisense strand comprises a ribonucleotide sequence which is complementary to said sense strand, wherein said sense strand and said antisense strand hybridize to each other to form said double-stranded molecule, and wherein said double-stranded molecule, when introduced into a cell expressing the ZNFN3A1 gene, inhibits expression of said gene.

50. The double-stranded molecule of claim 49, wherein said ZNFN3A1 target sequence comprises at least about 10 contiguous nucleotides from SEQ ID No:1.

51. The double-stranded molecule of claim 50, wherein said ZNFN3A1 target sequence comprises from about 19 to about 25 contiguous nucleotides from SEQ ID No:1.

52. The double-stranded molecule of claim 51, wherein said ZNFN3A1 target sequence is selected from the group consisting of nucleotides 451-471, 532-552, 623-643, 625-645, 636-656,726-746, 923-943, 1065-1085, and 1258-1278 of SEQ ID NO:1.

53. The double-stranded molecule of claim 49, wherein a single ribonucleotide transcript comprises the sense strand and the antisense strand, said double-stranded molecule further comprising a single-stranded ribonucleotide sequence linking said sense strand and said antisense strand.

54. The double-stranded molecule of claim 49, wherein the double stranded molecule is an oligonucleotide of less than about 100 nucleotides in length.

55. The double-stranded molecule of claim 54, wherein the double stranded molecule is an oligonucleotide of less than about 75 nucleotides in length.

56. The double-stranded molecule of claim 55, wherein the double stranded molecule is an oligonucleotide of less than about 50 nucleotides in length.

57. The double-stranded molecule of claim 56, wherein the double stranded molecule is an oligonucleotide of less than about 25 nucleotides in length.

58. The double-stranded nucleic acid molecule of claim 57, wherein the double stranded molecule is an oligonucleotide of between about 19 and about 25 nucleotides in length.

59. A vector encoding the double-stranded molecule of claim 49.

60. The vector of claim 59, wherein the vector encodes a transcript having a secondary structure, wherein the transcript comprises the sense strand and the antisense strand.

61. The vector of claim 59, wherein the transcript further comprises a single-stranded ribonucleotide sequence linking said sense strand and said antisense strand.